Supplementary Online Appendix: Elite Interests and Public Spending: Evidence from Prussian Cities

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March 11, 2019

Abstract

When do economic and political elites demand investment in public goods and services? The prevailing view is that non-democratic governments engage in low levels of government spending and taxation, because elites have interests in low taxation. Non-democracies exhibit significant variation in levels of government spending; the causes of these discrepancies have thus far not been thoroughly examined. I argue that where elites own capital that is conducive to government spending, regimes make more considerable investments. I test this argument using newly collected data on government spending as well as political and economic characteristics of 110 cities in 19th century Prussia. Using both standard regression models and instrumental variable analysis, I show that the economic needs of the local autocratic elites drove local government decisions on public spending.

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A Additional Maps

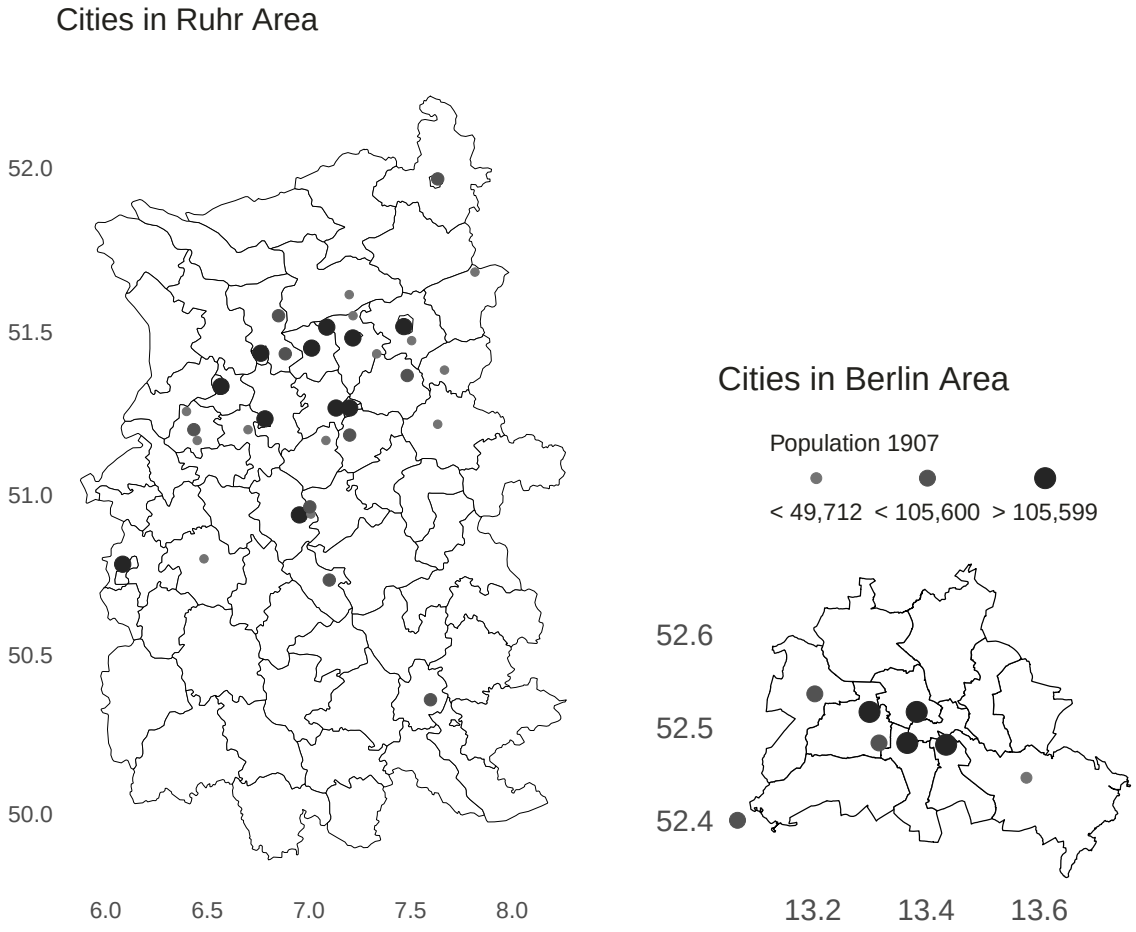

Figure A.1: The two plots show the location of cities in the sample that lie within the Ruhr Area and in what is today known as the city of Berlin. The overall sample includes 33 cities that are plotted in the top plot and lie in the western most part of Prussia, the most industrial area. What is today known as Berlin was made up of seven different cities at the time, plus Potsdam just outside of Berlin.

B Summary Statistics And Data Sources

Table B.1: Summary Statistics and Data Sources

	Source	Year	N	Mean	SD	Min	Max
ln School Expenditure pC (1905)	Silbergleit (1908)	1905	109	2.19	0.33	1.42	3.16
School Enrollment (1905)	Silbergleit (1908)	1905/06	110	0.65	0.11	0.43	1.00
ln School Expenditure pC (1895)	Silbergleit (1908)	1895	106	1.75	0.37	-0.30	2.50
Share Indust Employment (1882)	Becker et al. (2014)	1882	110	0.06	0.05	0.01	0.22
ln Industrial Workers (1882)	Becker et al. (2014)	1882	110	8.17	1.09	6.19	10.83
Share Indust Employment (1895)	Galloway (2007)	1895	103	0.47	0.15	0.14	0.75
Gini Income	Silbergleit (1908)	1893	105	0.33	0.06	0.20	0.52
Average Income	Silbergleit (1908)	1893	105	785.97	118.63	605.81	1267.47
logged Population	Silbergleit (1908)	1893	106	10.59	0.80	9.55	14.28
Per Capita Taxes	Silbergleit (1908)	1883	106	6.73	3.47	0.77	25.04
Protest Events	Tilly (1980)	1844–1906	110	9.43	17.26	0.00	71.00
Land Inequality	Becker et al. (2014)	1882	110	0.01	0.01	0.00	0.06
Longitude	Own Calculation		110	11.39	4.40	6.08	21.88
Share Born in City	Silbergleit (1908)	1905	110	0.43	0.10	0.10	0.65
ln Rainfall in MM	Silbergleit (1908)	1905	96	6.61	0.20	6.24	7.33
Ind French Presence	Acemoglu et al. (2011)		110	5.02	7.66	0.00	19.00
ln Area of County	MPIDR	1882	110	5.44	1.58	1.48	7.72
SPD Vote Share	Ziblatt and Blossom (2011)	1893	104	0.10	0.13	0.00	0.52
ln Distance to Carboniferous Area	Asch (2005)	NA	110	3.32	1.52	-0.76	5.78

Variables are measured at the city level except for those taken from Becker et al. (2014) and Galloway (2007) which are available at the country (Kreis). The indicator of French Control is region based (See Acemoglu et al. (2011) for coding).

C Additional OLS models

Table C.1: Full Results: OLS Model of Expenditure and Enrollment on Industrial Employment

	Ln(School Exp per capita)			**School Enrollment (1905)**		
Share Indust Employment (1882)	2.963***	2.438***	2.452***	1.175***	0.504***	0.397**
	(0.433)	(0.498)	(0.592)	(0.165)	(0.143)	(0.156)
Gini Income		-0.992	-0.770		-0.247	-0.007
		(2.338)	(2.537)		(0.630)	(0.666)
Average Income		-0.000	0.000		-0.000	-0.000
		(0.001)	(0.002)		(0.000)	(0.000)
logged Population		0.100***	0.135***		0.005	0.024*
		(0.037)	(0.050)		(0.010)	(0.014)
Per Capita Taxes		0.033**	0.028*		-0.002	-0.002
		(0.014)	(0.015)		(0.005)	(0.005)
Protest Events			0.003			0.001**
			(0.002)			(0.001)
Longitude			0.087**			-0.014
			(0.038)			(0.011)
Share Born in City			0.819			0.124
			(0.558)			(0.142)
ln Rainfall in MM			-0.087			0.090**
			(0.204)			(0.036)
ln Area of County			0.025			0.014**
			(0.022)			(0.006)
Land Inequality			-2.950			0.322
			(2.350)			(0.594)
Ind French Presence			0.023			-0.011*
			(0.027)			(0.006)
SPD Vote Share (1893)			-0.648**			-0.182***
			(0.264)			(0.068)
Constant	2.017***	1.147**	-0.440	0.579***	0.723***	-0.120
	(0.043)	(0.536)	(1.568)	(0.014)	(0.157)	(0.333)
Province FE	No	Yes	Yes	No	Yes	Yes
Franchise Rule Indicator	No	Yes	Yes	No	Yes	Yes

OLS models with standard errors clustered at Kreis (county). * p<0.10, ** p<0.05, *** p<0.01

Table C.2: Full Results: OLS Model of Expenditure and Enrollment on Industrial Employment **Measured in 1895**

	Ln(School Exp per capita)			**School Enrollment (1905)**		
Share Indust Employment (1895)	1.210***	0.788***	0.960***	0.483***	0.265***	0.222***
	(0.174)	(0.249)	(0.329)	(0.051)	(0.058)	(0.064)
Gini Income		-1.564	-1.250		-0.461	-0.385
		(2.781)	(2.450)		(0.642)	(0.643)
Average Income		0.000	0.000		0.000	0.000
		(0.001)	(0.001)		(0.000)	(0.000)
logged Population		0.066*	0.144***		-0.007	0.023**
		(0.035)	(0.052)		(0.009)	(0.012)
Per Capita Taxes		0.022*	0.024*		-0.002	-0.000
		(0.013)	(0.013)		(0.005)	(0.005)
Protest Events			0.002			0.001**
			(0.002)			(0.001)
Longitude			0.089**			0.001
			(0.036)			(0.012)
Share Born in City			0.612			0.100
			(0.597)			(0.124)
ln Rainfall in MM			-0.045			0.099**
			(0.229)			(0.038)
ln Area of County			0.032			0.011**
			(0.021)			(0.005)
Land Inequality			-3.921**			0.200
			(1.938)			(0.508)
Ind French Presence			0.022			-0.004
			(0.023)			(0.006)
SPD Vote Share (1893)			-0.985***			-0.246***
			(0.279)			(0.066)
Constant	1.627***	0.981**	-1.209	0.419***	0.724***	-0.410
	(0.087)	(0.467)	(1.583)	(0.027)	(0.142)	(0.355)
Province FE	No	Yes	Yes	No	Yes	Yes
Franchise Rule Indicator	No	Yes	Yes	No	Yes	Yes

OLS models with standard errors clustered at Kreis (county). * p<0.10, ** p<0.05, *** p<0.01

Table C.3: Full Results: OLS Model of Expenditure and Enrollment on **ln Absolute Number of Industrial Workers**

	Ln(School Exp per capita)			**School Enrollment (1905)**		
ln Industrial Workers (1882)	0.170***	0.134***	0.123***	0.056***	0.033***	0.021***
	(0.021)	(0.030)	(0.031)	(0.011)	(0.007)	(0.008)
Gini Income		-1.396	-1.423		-0.357	-0.133
		(2.393)	(2.710)		(0.613)	(0.670)
Average Income		-0.000	0.001		0.000	-0.000
		(0.001)	(0.002)		(0.000)	(0.000)
logged Population		0.069*	0.063		-0.003	0.012
		(0.039)	(0.054)		(0.010)	(0.014)
Per Capita Taxes		0.031**	0.022*		-0.002	-0.003
		(0.012)	(0.013)		(0.004)	(0.005)
Protest Events			0.003			0.001*
			(0.003)			(0.001)
Longitude			0.081**			-0.015
			(0.038)			(0.010)
Share Born in City			0.768			0.119
			(0.558)			(0.137)
ln Rainfall in MM			-0.035			0.095***
			(0.188)			(0.036)
ln Area of County			-0.001			0.010
			(0.023)			(0.006)
Land Inequality			-3.414			0.260
			(2.373)			(0.558)
Ind French Presence			0.023			-0.011*
			(0.026)			(0.006)
SPD Vote Share (1893)			-0.697***			-0.189***
			(0.256)			(0.067)
Constant	0.801***	0.192	-0.795	0.192**	0.495***	-0.163
	(0.180)	(0.504)	(1.381)	(0.086)	(0.161)	(0.309)
Province FE	No	Yes	Yes	No	Yes	Yes
Franchise Rule Indicator	No	Yes	Yes	No	Yes	Yes

OLS models with standard errors clustered at Kreis (county). * p<0.10, ** p<0.05, *** p<0.01

Table C.4: Full Results: OLS Model of Expenditure and Enrollment on Industrial Employment – **Accounting for Multiple Cities**

	Ln(School Exp per capita)	**School Enrollment (1905)**
Share Indust Employment (1882)	2.785***	0.400**
	(0.689)	(0.179)
Gini Income	-0.729	-0.007
	(2.555)	(0.672)
Average Income	0.000	-0.000
	(0.002)	(0.000)
logged Population	0.148***	0.024*
	(0.052)	(0.014)
Per Capita Taxes	0.024	-0.002
	(0.016)	(0.005)
Protest Events	0.004*	0.001**
	(0.002)	(0.001)
Longitude	0.081**	-0.014
	(0.039)	(0.011)
Share Born in City	0.756	0.124
	(0.571)	(0.145)
ln Rainfall in MM	-0.135	0.089**
	(0.211)	(0.039)
ln Area of County	0.033	0.014*
	(0.022)	(0.007)
Land Inequality	-2.817	0.323
	(2.387)	(0.603)
Ind French Presence	0.018	-0.011
	(0.028)	(0.007)
SPD Vote Share (1893)	-0.668**	-0.182***
	(0.261)	(0.069)
Constant	-0.212	-0.118
	(1.598)	(0.344)
Province FE	Yes	Yes
Franchise Rule Indicator	Yes	Yes
Multiple City Indicator	Yes	Yes

OLS models with standard errors clustered at Kreis (county). * p<0.10, ** p<0.05, *** p<0.01

Table C.5: Full Results: OLS Model of Expenditure and Enrollment on Industrial Employment **(Province Clustered SE)**

	Ln(School Exp per capita)			**School Enrollment (1905)**		
Share Indust Employment (1882)	2.963***	2.438***	2.452***	1.175***	0.504***	0.397**
	(0.367)	(0.590)	(0.434)	(0.236)	(0.161)	(0.144)
Gini Income		-0.992	-0.770		-0.247	-0.007
		(2.833)	(2.625)		(0.391)	(0.632)
Average Income		-0.000	0.000		-0.000	-0.000
		(0.001)	(0.001)		(0.000)	(0.000)
logged Population		0.100***	0.135**		0.005	0.024*
		(0.031)	(0.061)		(0.013)	(0.011)
Per Capita Taxes		0.033	0.028		-0.002	-0.002
		(0.020)	(0.017)		(0.005)	(0.005)
Protest Events			0.003			0.001*
			(0.002)			(0.001)
Longitude			0.087*			-0.014
			(0.042)			(0.010)
Share Born in City			0.819			0.124
			(0.668)			(0.155)
ln Rainfall in MM			-0.087			0.090***
			(0.257)			(0.025)
ln Area of County			0.025			0.014*
			(0.028)			(0.007)
Land Inequality			-2.950			0.322
			(3.123)			(0.511)
Ind French Presence			0.023			-0.011**
			(0.026)			(0.004)
SPD Vote Share (1893)			-0.648**			-0.182***
			(0.238)			(0.050)
Constant	2.017***	1.147*	-0.440	0.579***	0.723***	-0.120
	(0.063)	(0.599)	(2.355)	(0.027)	(0.147)	(0.280)
Province FE	No	Yes	Yes	No	Yes	Yes
Franchise Rule Indicator	No	Yes	Yes	No	Yes	Yes

OLS models with standard errors clustered at province. * p<0.10, ** p<0.05, *** p<0.01

Table C.6: Full Results: OLS Model of **Expenditure in 1895** on Industrial Employment

	Ln(School Exp per capita)	
Share Indust Employment (1882)	2.285**	1.752***
	(0.863)	(0.315)
Gini Income		1.797
		(3.011)
Average Income		-0.002
		(0.002)
logged Population		0.135***
		(0.028)
Per Capita Taxes		0.055**
		(0.019)
Constant	1.616***	0.648
	(0.052)	(0.632)
Province FE	No	Yes
Franchise Rule Indicator	No	Yes

OLS models with standard errors clustered at province. * p<0.10, ** p<0.05, *** p<0.01

D Spatial Autoregressive Models

Table D.1: Spatial Autoregressive Models: Expenditure and Enrollment on Industrial Employment

	Ln(School Exp per capita)			**School Enrollment (1905)**		
Share Indust Employment (1882)	1.642***	2.746***	2.711***	0.518***	0.446***	0.409***
	(0.366)	(0.455)	(0.562)	(0.178)	(0.152)	(0.123)
Gini Income		-1.078	-0.096		-0.614	-0.005
		(1.876)	(1.739)		(0.618)	(0.553)
Average Income		-0.000	-0.000		0.000	-0.000
		(0.001)	(0.001)		(0.000)	(0.000)
logged Population		0.063*	0.137***		0.001	0.024**
		(0.034)	(0.040)		(0.011)	(0.012)
Per Capita Taxes		0.033***	0.023*		0.000	-0.002
		(0.011)	(0.013)		(0.005)	(0.004)
Protest Events			0.003			0.001**
			(0.002)			(0.001)
Longitude			0.078**			-0.014
			(0.031)			(0.009)
Share Born in City			0.800*			0.124
			(0.474)			(0.118)
ln Rainfall in MM			-0.024			0.093***
			(0.175)			(0.032)
ln Area of County			0.025			0.014***
			(0.017)			(0.005)
Land Inequality			-2.860			0.318
			(1.917)			(0.485)
Ind French Presence			0.040***			-0.000
			(0.013)			(0.004)
SPD Vote Share (1893)			-0.693***			-0.184***
			(0.211)			(0.056)
Constant	-0.662	1.977	0.863	-0.218	0.332	-0.094
	(0.533)	(1.225)	(1.691)	(0.140)	(0.320)	(0.312)
λ	1.242***	-0.209	-0.770	1.280***	0.496	-0.080
	(0.241)	(0.603)	(0.610)	(0.221)	(0.531)	(0.463)
Province FE	No	Yes	Yes	No	Yes	Yes
Franchise Rule Indicator	No	Yes	Yes	No	Yes	Yes

Spatial Autoregressive models estimated via GS2SLS with heteroscedastic SEs. Spatial weights matrix based on inverse distance between cities. λ is the estimate of the spatial autoregressive parameter. * p<0.10, ** p<0.05, *** p<0.01

E Instrumental Variable Analysis

Table E.1: Full Results: OLS Model of Industrial Employment on Distance to Carboniferous Area (First-Stage)

	Ln(Distance to Carboniferous Area)
ln Distance to Carboniferous Area	-0.024***
	(0.006)
Gini Income	0.130
	(0.333)
Average Income	-0.000
	(0.000)
logged Population	-0.007
	(0.009)
Per Capita Taxes	-0.005**
	(0.002)
Protest Events	0.001
	(0.001)
Longitude	0.002
	(0.006)
Share Born in City	-0.150*
	(0.078)
ln Rainfall in MM	0.062*
	(0.035)
ln Area of County	-0.002
	(0.003)
Land Inequality	-0.858**
	(0.404)
Ind French Presence	0.003
	(0.004)
SPD Vote Share (1893)	-0.025
	(0.042)
Constant	-0.160
	(0.311)
Province FE	Yes
Franchise Rule Indicator	Yes

OLS models with robust standard errors. * p<0.10, ** p<0.05, *** p<0.01

Table E.2: s-2sls Estimates: Expenditure and Enrollment on Industrial Employment (Instrumented) – Full Results

	Ln(School Exp per capita)		**School Enrollment (1905)**	
Share Indust Employment (1882)	3.014***	2.768***	0.463**	0.488***
	(0.743)	(0.622)	(0.204)	(0.156)
Gini Income	-1.095	-0.099	-0.619	-0.084
	(1.858)	(1.749)	(0.613)	(0.568)
Average Income	-0.000	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)
logged Population	0.064*	0.137***	0.001	0.022*
	(0.034)	(0.040)	(0.011)	(0.013)
Per Capita Taxes	0.035***	0.023*	0.000	-0.002
	(0.012)	(0.013)	(0.005)	(0.004)
Protest Events		0.003		0.001**
		(0.002)		(0.001)
Longitude		0.078**		-0.014
		(0.032)		(0.009)
Share Born in City		0.806*		0.192*
		(0.475)		(0.115)
ln Rainfall in MM		-0.028		
		(0.174)		
ln Area of County		0.025		0.015**
		(0.017)		(0.006)
Land Inequality		-2.825		0.406
		(1.913)		(0.517)
Ind French Presence		0.040***		-0.011
		(0.013)		(0.050)
SPD Vote Share (1893)		-0.691***		-0.149**
		(0.211)		(0.060)
Constant	2.157	0.928	0.337	0.322
	(1.381)	(1.814)	(0.327)	(0.317)
λ	-0.287	-0.789	0.490	0.225
	(0.660)	(0.636)	(0.536)	(0.450)
Province FE	Yes	Yes	Yes	Yes
Franchise Rule Indicator	Yes	Yes	Yes	Yes

Spatial 2sls models with heteroscedastic standard errors. Spatial weights matrix based on inverse distance between cities. λ is the estimate of the spatial autoregressive parameter. Ln Rainfall in MM is dropped from the enrollment model with full controls due to singularity. * p<0.10, ** p<0.05, *** p<0.01

Table E.3: 2sls Estimates: Expenditure and Enrollment on Industrial Employment (Instrumented) – Full Results

	Ln(School Exp per capita)		**School Enrollment (1905)**	
Share Indust Employment (1882)	2.248***	2.784***	0.570***	0.453***
	(0.763)	(1.050)	(0.201)	(0.174)
Gini Income	-0.968	-0.905	-0.255	0.274
	(2.103)	(2.044)	(0.562)	(0.545)
Average Income	-0.000	0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)
logged Population	0.100***	0.138***	0.005	0.014
	(0.033)	(0.043)	(0.009)	(0.012)
Per Capita Taxes	0.031**	0.030**	-0.002	-0.002
	(0.014)	(0.013)	(0.005)	(0.004)
Protest Events		0.003		0.002***
		(0.002)		(0.001)
Longitude		0.086***		-0.011
		(0.033)		(0.009)
Share Born in City		0.857*		0.119
		(0.483)		(0.095)
ln Rainfall in MM		-0.127		
		(0.194)		
ln Area of County		0.027		0.009*
		(0.019)		(0.005)
Land Inequality		-2.735		0.263
		(1.996)		(0.556)
Ind French Presence		0.140***		-0.027
		(0.047)		(0.017)
SPD Vote Share (1893)		-0.632***		-0.096
		(0.215)		(0.068)
Constant	1.135**	-0.956	0.727***	0.728***
	(0.470)	(1.468)	(0.140)	(0.228)
Province FE	Yes	Yes	Yes	Yes
Franchise Rule Indicator	Yes	Yes	Yes	Yes

2sls models. Standard Errors clustered by County. Ln Rainfall in MM is dropped from the enrollment model with full controls due to singularity. * p<0.10, ** p<0.05, *** p<0.01

F Effect of Unobservables

As a last robustness check, I follow Oster (2017) and calculate how strong unobservables would have to be to invalidate the results regarding the effect of industrial employment found above. In essence, this method provides an estimation of how influential unobserved factors would have to be to make the effect of industrial employment disappear because of omitted variable bias. δ is the "relative degree of selection on observed and unobserved variable," i.e., what is our belief about the importance of controls that are not included in the regression compared to those that are.[1] R_{max} is defined as the maximum R-squared that would be the result of the hypothetical regression that includes all relevant variables, both observed and unobserved. Oster's (2017) rule of thumb is that results are more likely to be robust to unobservables if $\delta \geq 1$.

Conditional on a pre-set R^2, the method provides an estimate of approximately how large δ would have to be to invalidate the estimated effect of industrial employment on each of the outcomes, given an assumed R_{max}. I estimate the δ for the main variable of interest for both dependent variables for two suggested values for R_{max}. The largest possible value it could take, or the absolute upper bound: 1. This is the most conservative test possible. Based on empirical evidence using the results of randomized experiments, Oster (2017) suggests that a R_{max} of 1.3 times the R^2 from the relevant regression might be more appropriate. I therefore estimate δ for the full regression models displayed in Table 1 in the manuscript using both possible values of R_{max}. The relevant values are displayed in Table F.4.

Table F.4 shows the estimated δ values for $R_{max} = 1$ and when R_{max} is set to 1.3 times

[1] One should note, however, the criticism about this interpretation by Cinelli and Hazlett (2018, 24), who argue that δ here is not exclusively the relative explanatory power of unobservables to observables but also depends on "their association with the outcome".

Table F.4: Selection on Unobservables

	per Capita School Cost	School Enrollment
$R_{max} = 1$	$\delta = 0.8$	$\delta = 0.63$
$R_{max} = 1.3 \times R^2$	$\delta = 1.23$	$\delta = 0.63$

the R^2 in the controlled regression. For per capita school expenditure as the dependent variable the δ in the most conservative test is close to one and above one when R_{max} is slightly lower. With enrollment as the dependent variable, the results are slightly weaker, and 1.3 times R^2 in the controlled regression is larger than one, i.e., larger than the maximum possible value. Even though δ here is smaller than one, it is important to keep in mind that the full model here includes an extensive set of possible control variables, including province fixed effects. It is therefore relatively unlikely that unobservables have much explanatory power relative to the set of variables included.

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